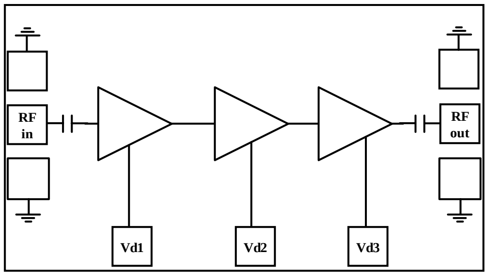
8 - 18 GHz Low Noise Amplifier

Features

- Frequency Range : 8.0 – 18.0GHz
- Better than 2.4 dB noise figure
- 23 dB Nominal gain
- 12 dBm min. P1 dB
- Input Return Loss > 10 dB
- Output Return Loss > 10 dB
- Single supply operation
- No external matching required
- DC decoupled input and output
- 0.15 µm InGaAs pHEMT Technology
- Chip dimension: 2.5 x 1.5 x 0.1 mm

Functional diagram



Typical Applications

- Radar
- Military
- Test equipment and sensors

Description

The AMT2152011 is a Low Noise Amplifier operating in 8.0 – 18.0 GHz frequency range. The LNA uses 3 stages of amplification and provides 23 dB of gain with an impressive mid-band noise figure of 1.5 dB and a maximum NF of 2.4 dB at 8 GHz. The amplifier exhibits a good match over the entire band with typical input and output return losses better than 10 dB. The LNA has a minimum P1 dB of 12 dBm. The amplifier operates on a single +3V DC supply. The Circuits grounds on the die are provided through vias to the backside metallization. The die is fabricated using a reliable 0.15µm pHEMT technology.

Absolute Maximum Ratings(1)

Parameter	Absolute Maximum	Units
Positive DC voltage	+6	V
RF input power	+15	dBm
Supply Current	150	mA
Operating Temperature	-55 to +85	°C
Storage Temperature	-65 to +150	°C

1. Operation beyond these limits may cause permanent damage to the component

Electrical Specifications @ T_A = 25 °C, Zo =50Ω; $V_{d1} = V_{d2} = V_{d3}$ = 3V

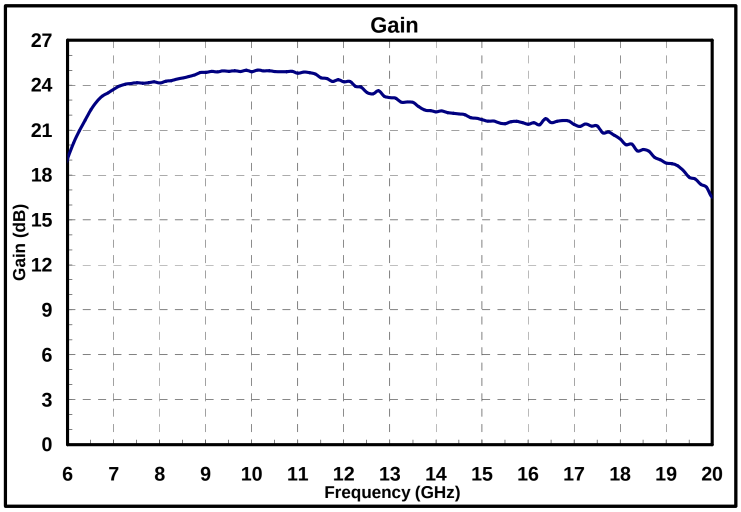
Parameter	Value	Value	Value	Units
Frequency Range	8.0 – 12.0	12.0 – 16.0	16.0 – 18.0	GHz
Gain	24.5	23.0	20.0	dB
Gain Flatness	± 0.5	± 1.4	± 0.7	dB
Noise Figure (max.)	2.4.	2.0	2.4	dB
Input Return Loss(min.)	10	9	8.	dB
Output Return Loss (min.)	9	10	10	dB
Output Power (P1 dB) (min.)	11.	11	11	dBm
Saturated output power (Psat)	13	13	13	dBm
Output Third Order Intercept (IP3)	22	22	22	dBm
Supply Current	95			mA

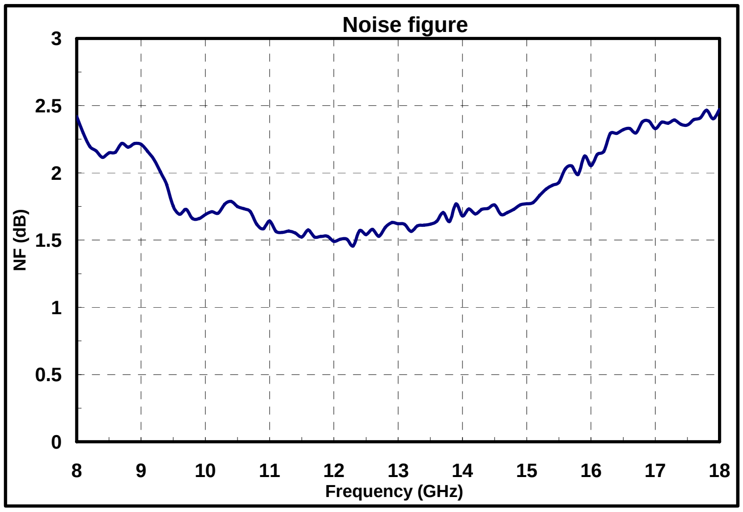
Note:

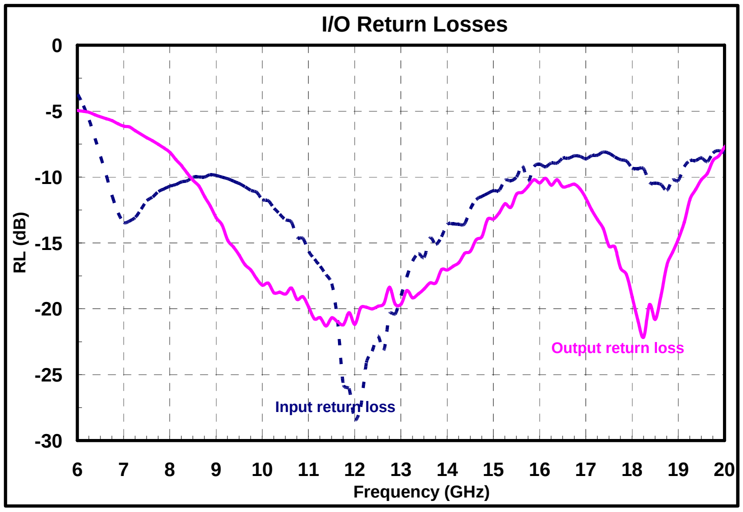
1. Electrical specifications as measured in a test fixture.

Test fixture data

Vd1 = Vd2 = Vd3 = 3V, Total Current = 95 mA, T_A *= 25 °C*







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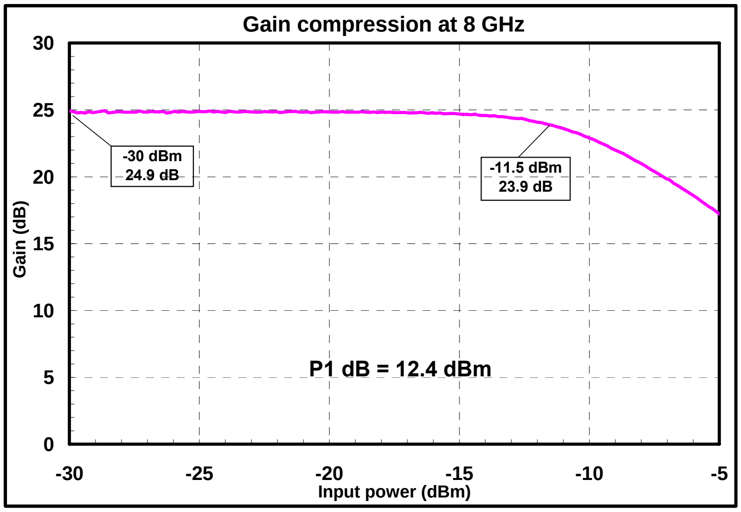
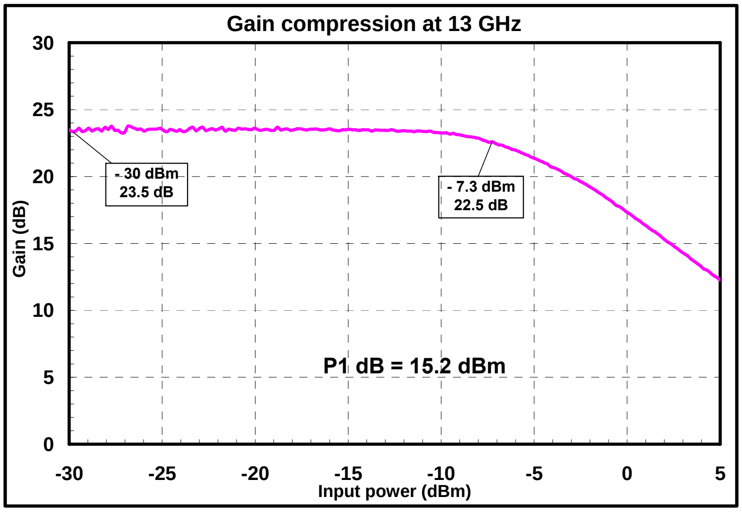
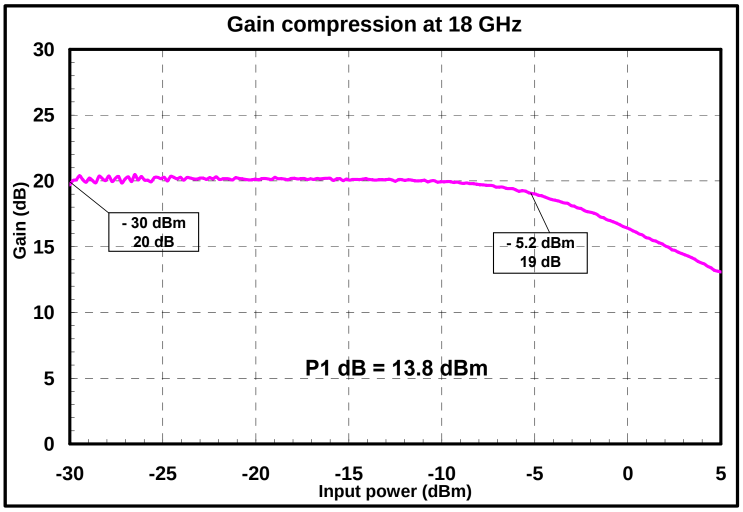
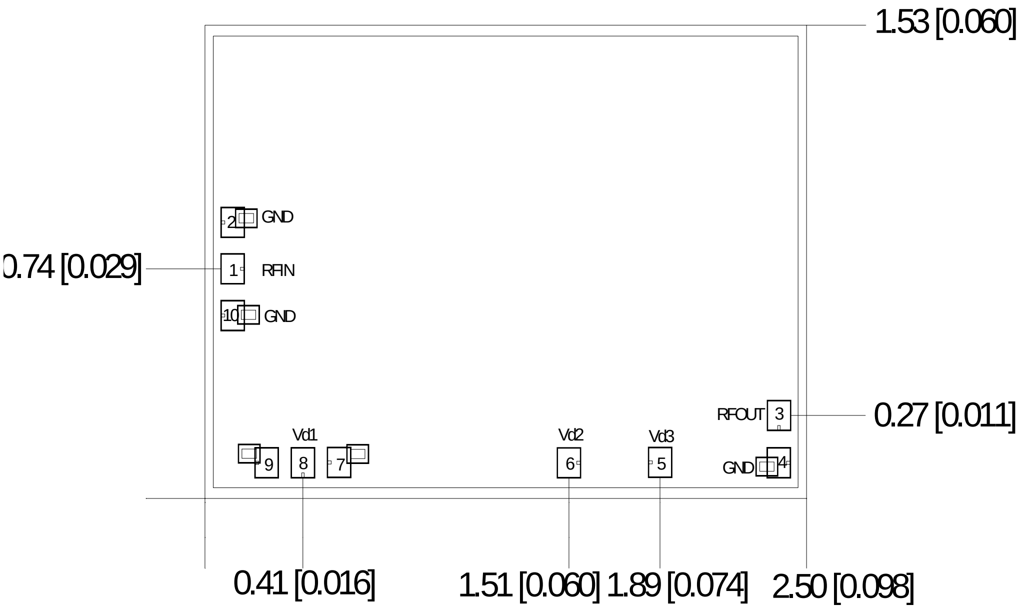






Mechanical Characteristics



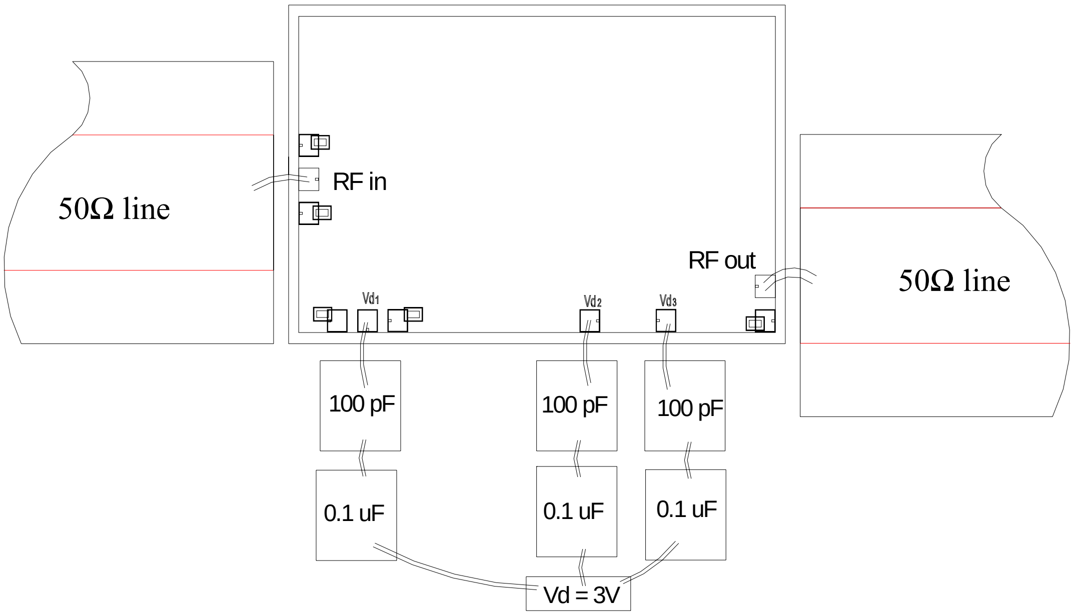
Units: millimeters (inches)

All RF and DC bond pads are 100µm x 100µm

Note:

1. **Pad no. 8: Vd1**
2. **Pad no. 6: Vd2**
3. **Pad no. 5: Vd3**
4. **Pad no. 3: RF out**
5. **Pad no. 1: RF in**

Recommended Assembly Diagram



Note:

1. Two 1 mil (0.0254mm) bond wires of minimum length should be used for RF input and output.
2. Two 1 mil (0.0254mm) bond wires of minimum length should be used from chip bond pad to 100pF capacitor.
3. Input and output 50 ohm lines are on 5 mil substrate.
4. 0.1 μF capacitors may be additionally used as a second level of bypass for reliable operation.
5. The bond numbers shown in assembly diagram are as per bond pad numbers printed on the die.
6. The RF input & outputs ports are DC decoupled on-chip.

Die attach: For Epoxy attachment, use of a two-component conductive epoxy is recommended. An epoxy fillet should be visible around the total die periphery. If Eutectic attachment is preferred, use of fluxless AuSn (80/20) 1-2 mil thick preform solder is recommended. Use of AuGe preform should be strictly avoided.

Wire bonding: For DC pad connections use either ball or wedge bonds. For best RF performance, use of 150 - 200μm length of wedge bonds is advised. Single Ball bonds of 250-300μm though acceptable, may cause a deviation in RF performance.

GaAs MMIC devices are susceptible to Electrostatic discharge. Proper precautions should be observed during handling, assembly & testing